

Risk Stabilization: Improving the risk-return tradeoff

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HighVista Strategies

HighVista Strategies was founded in 2004 by an experienced team with diverse backgrounds in endowment management, hedge fund and principal investing, wealth management and academia.

We focus singularly on achieving attractive risk-adjusted portfolio returns through investing across public and private markets. We utilize the time-tested principles of endowment investing and a forward-thinking application of risk management to manage globally diversified investment strategies and solutions tailored for our clients' varying needs. The priority placed on capital preservation and avoiding major drawdowns fosters the patient and rigorous pursuit of excess returns, and is itself a critical driver of long-term performance.

Executive Summary

Any approach to asset allocation should be evaluated on at least two metrics: first, is it consistent with my tolerance for risk? Second, does it maximize my return given the amount of risk taken? We present an approach to satisfying these dual objectives which has proven effective over time and across many markets and cycles. We call this approach Risk Stabilization.

In this white paper, we highlight the principles which underlie this approach, specifically that:

- Market risks are dynamic
- Market risk today is a good predictor of future risk of loss
- Higher market risk today does not translate into higher expected return
- Risk Stabilization adds value over time by allocating capital when and where the risk/reward tradeoff is most attractive

We further examine the recent performance of this strategy and consider its relevance in today's market environment. Through a simplified version of this strategy using MSCI ACWI as a benchmark we establish its consistency in adding value over time and across market cycles. Our work demonstrates the value in an approach grounded in the principles of Risk Stabilization.

Risk Stabilization: Improving the Risk-Return Tradeoff

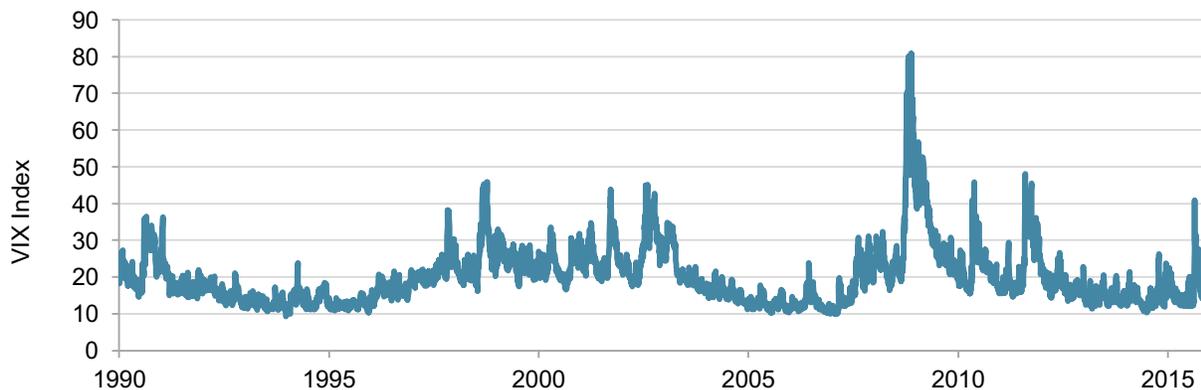
All investors are concerned with the risk of loss in their portfolio, and meeting an investor's preference for risk is one of the primary purposes of any asset allocation program.

Because market risks are not constant, matching an investor's risk preferences over time requires dynamic adjustment of portfolio weights. Managing the portfolio to a constant level of risk is called Risk Stabilization, and has been a key part of HighVista's approach to asset allocation for the last 10+ years.

Risks are dynamic

Investors are keenly aware of the dynamic nature of market risks. One simple measure for the risk in equity markets is the VIX Index, which measures the implied volatility of a basket of options on the S&P 500. This is a "market price" for risk in that its price is determined by investor willingness to buy or sell insurance against market moves. In what follows we make use of this index as it is well known and transparent. Its value since its inception in 1990 is plotted below:

Figure 1: The VIX Index since its inception in 1990



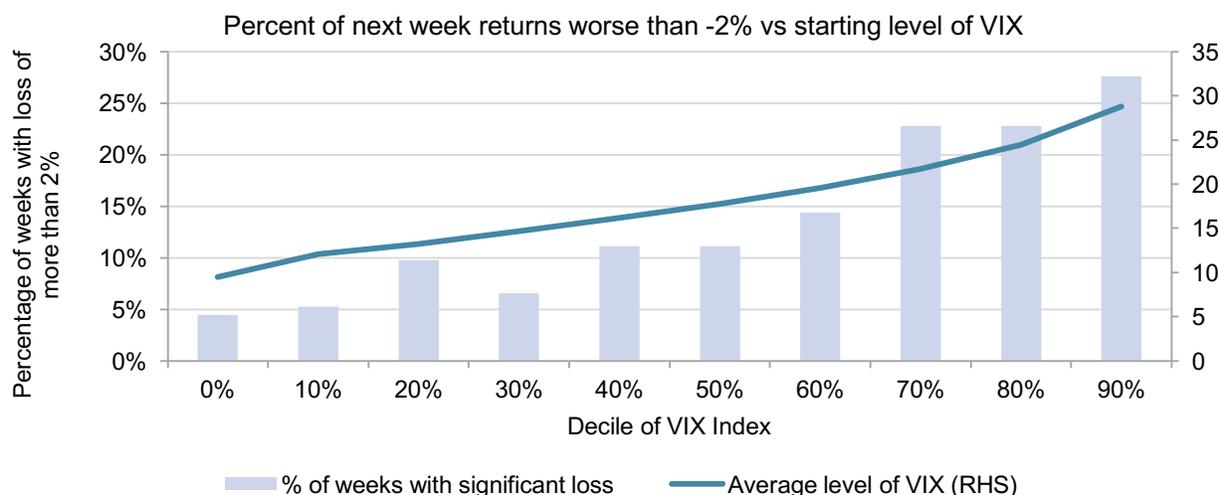
Higher values for the VIX Index are driven by two factors: higher expectations for future market volatility and/or greater investor concern about risk (less willingness by investors to take risk). At its highest levels in 2008, for example, there was good reason to believe that volatility would continue given uncertainties about the state of the financial system and the Fed's response to the growing crisis. Since then there have been other episodes where the VIX has risen in response to other market uncertainties ranging from natural disasters (the tsunami in Japan), to political uncertainty (the Arab spring, the future of Greece and the Euro), to economic news (China growth, Fed policy).

The VIX forecasts the risk of loss

While imperfect, the level of the VIX has been a very good forecast of the future risk of loss. To illustrate, consider the following exercise. First, using weekly data since 1990, sort weeks into 10 equal-sized "buckets" based on the level of the VIX at the start of the week. Then within each bucket calculate the percentage of weeks where global equities experienced a significant loss (in this exercise we define this as a loss of at least 2%). Do weeks that begin with the VIX at a low level have a lower chance of a significant loss?

The results of this exercise are shown in **Figure 2** below. The average value of the VIX within each bucket is plotted as the blue line, while the percentage of weeks within each bucket that experienced a significant loss are plotted as bars. The clear positive relationship between the line and the bars demonstrates how clearly the level of the VIX forecasts the risk of loss over the subsequent week. For example, if the VIX at the start of the week is in the highest bucket (a level of roughly 29 or above—see the farthest right value of the blue line) the chance of a significant loss during the week is roughly 27% (the rightmost grey bar), while if the VIX begins the week in the lowest bucket (a level of roughly 12 or below) the chance of a significant loss during the week is less than 5%.

Figure 2: Level of the VIX predicts future probability of loss¹



Given a forecast that the risk of loss is elevated, should investors change their positioning? In the absence of a strong market view otherwise, we think the clear answer is yes. Most simply, investors should want to maintain a level of risk exposure consistent with their tolerance for risk—it does not make sense to allow market events to change the amount of risk you take. Unfortunately a mismatch between actual and desired risk is often discovered only in hindsight after a market drawdown.

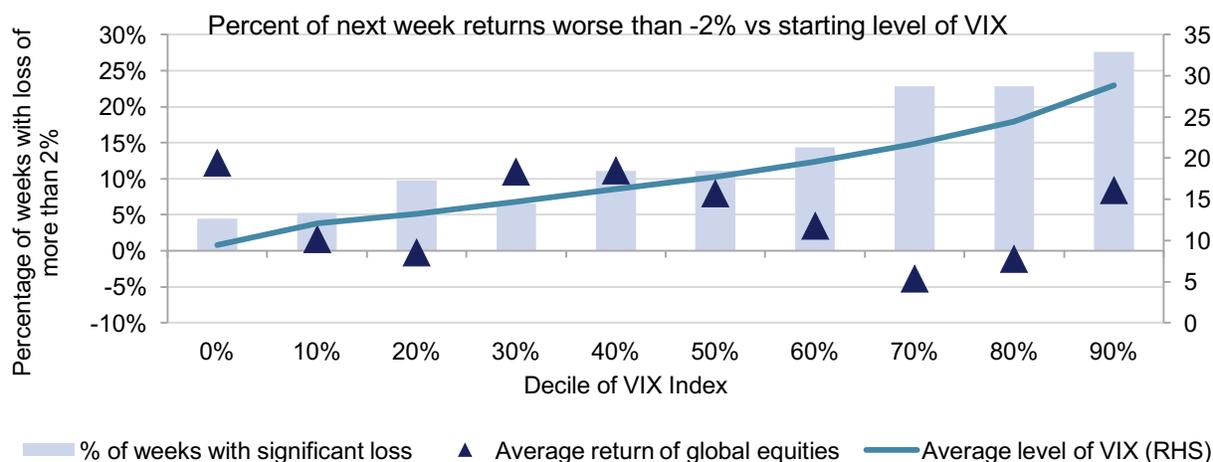
The VIX does not forecast expected return

Of course a critical missing piece of the above analysis is the chance of a very positive return, which is also higher when the level of the VIX is higher. If higher levels of the VIX forecast greater risk of loss but a much greater chance of a significant gain it may make sense to remain fully invested even when the risk of loss is high. Said another way, a higher level of the VIX forecasts a greater chance of loss, but maybe it also forecasts a greater expected return?

To investigate this possibility we modified the previous exercise that generated **Figure 2** to add an additional calculation for return. Specifically we can calculate the average return for global equities across the weeks within each bucket. Do weeks that begin with the VIX at higher levels on average have greater returns? **Figure 3** below plots the result overlaid on **Figure 2** described earlier, with the average return within each bucket plotted as a triangle:

¹ Source: HighVista Calculations

Figure 3: Level of VIX does not predict expected return²



The triangles in **Figure 3** are not positively related to the blue line representing the level of the VIX, in fact if anything there is a slightly negative relationship. Starting the week with an elevated level of the VIX does not imply that returns for that week will be any higher on average than for a week when the VIX is low.

Risk Stabilization improves the reward-to-risk tradeoff over the long run

Putting all of **Figure 3** together we conclude that the starting level of the VIX forecasts risk but does not forecast expected return. This is the second reason that investors should change their positioning in reaction to volatility: markets immediately following elevated volatility have a greater chance of loss without any additional return. Reducing risk exposure in these periods reallocates risk capital away from periods where the risk/reward tradeoff is poor and toward those where it is more favorable. Over time this increases the expected return per unit of risk, and for the same level of risk will therefore yield a greater return.

This insight is at the heart of Risk Stabilization and has been borne out over the last 25 years of available VIX data as well as in other capital markets and other periods. **Figure 4** illustrates the value-added that would have been realized through a simple Risk Stabilization approach. At the beginning of each week the level of the VIX is observed and a portfolio that is composed of global equities and cash is constructed. When the level of the VIX is low, more equities are held (potentially with leverage) and when the level of the VIX is high the portfolio holds more cash.³

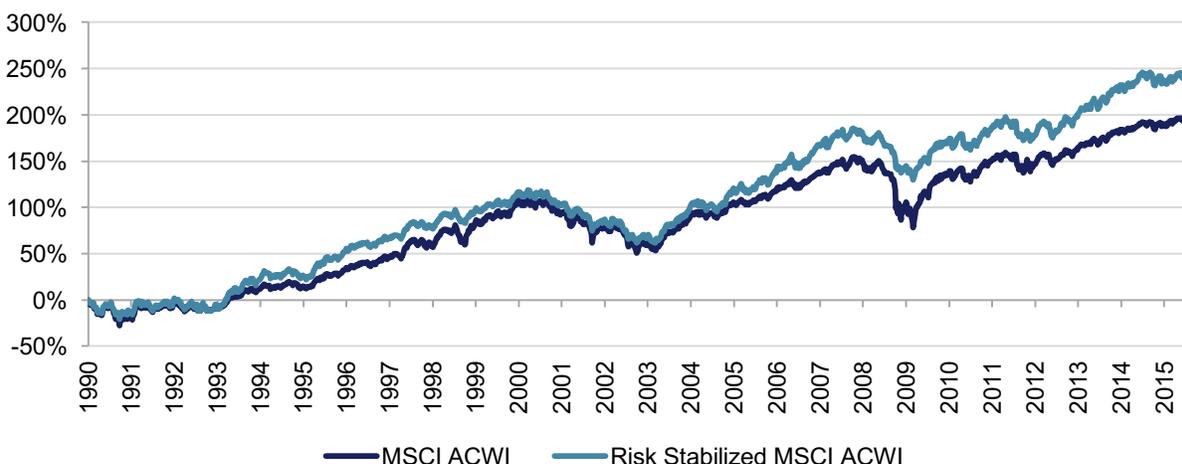
Figure 4 plots the cumulative performance of MSCI ACWI and of this simple Risk Stabilized version.⁴ Over this roughly 25 year period the Risk Stabilized portfolio would have generated an annualized excess return of roughly 1.6% over MSCI ACWI with the same volatility and lower maximum drawdown (-45% vs -57% for MSCI ACWI).

² Source: Bloomberg & HighVista Calculations

³ Specifically the amount of equities held on a particular day is proportional to the ratio of the VIX on that day to the realized volatility of the MSCI ACWI Index from its inception in 1987 until that day. To make an apples-to-apples comparison, the proportion is scaled by a constant to account for the average difference in volatility between the VIX and MSCI ACWI. The constant is calibrated ex-post so that the two series have exactly the same volatility over the full sample.

⁴ To better compare periods of relative performance in **Figure 4** we plot the arithmetic sum of returns rather than compounded return series.

Figure 4: MSCI ACWI and Risk-Stabilized MSCI ACWI



Comparing the two series of **Figure 4** is useful to identify when this simplified version of Risk Stabilization has performed best. It is important to note that outperformance is spread across multiple periods—it is not an artifact of one fortuitous episode. This simple approach added value in the 1990s until the tech bubble, then again from 2003 through the rebound from the financial crisis, and finally again over the last few years leading up to the last 12 months. Periods of relative underperformance include the tech bubble years (when volatility was high but so were returns), the strong rebound in 2009-2011, and the most recent year. Clearly over this 25-year period this simple expression of Risk Stabilization has on balance added significant value over various market cycles and regimes.

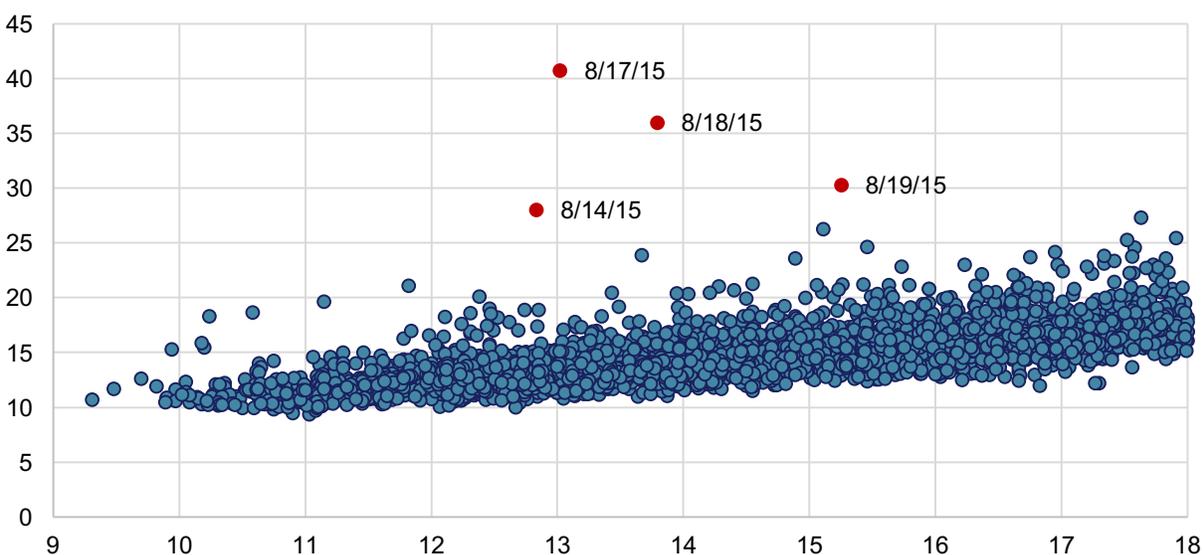
Recent performance of Risk Stabilization

While much could be written about how Risk Stabilization has performed in many sub-periods of **Figure 4**, the most topical is of course the recent performance, which has been below average for both this simple version and for the more complete approach that underpins HighVista's asset allocation process. As **Figure 4** makes clear, in the context of the 25 years of history this recent underperformance is visible but certainly not unprecedented. It is also worth noting many prior periods of underperformance were followed by multiple years of strong outperformance.

Why has Risk Stabilization performed poorly over the last year? The first and most intuitive answer is that while there has been some return of pockets of volatility they have not portended any significant or sustained drawdown in global equities. This certainly may owe to the aggressive actions of central banks today to act at the first sign of trouble around the world. Investors have continued to place great confidence in these policy actions to arrest any minor fissures in the global economy before they can grow. Of course this is only true until it isn't.

The other reason for the most recent underperformance in Q3 2015 is the speed of change in the level of volatility. To illustrate how dramatic the spike in the VIX in August was, we present **Figure 5** below, which plots the VIX on the x-axis with the value of the VIX one week later on the y-axis. As we are interested in measuring spikes in the VIX starting from lower levels the x-axis is truncated at 18, which is roughly the median value of the VIX over this period.

Figure 5: One week VIX changes from below median (1990-2015)



The spike in the VIX in August was unprecedented, as illustrated by the labeled red dots in **Figure 5**. For example on 8/17/15 the VIX was about 13, and a week later it was above 40 (see the red dot labeled 8/17/15). Prior to this day the VIX had never reached even 25 within a week of being below 15, and had never reached 30 within a week of being below 18. The four most dramatic one-week changes since 1990 were all part of the same spike in volatility in mid-August. This abrupt change in volatility left little time for a Risk Stabilization approach to adjust exposure causing the underperformance illustrated on the right side of **Figure 4**.

Risk Stabilization going forward

While the recent performance is disappointing, perhaps the most common mistake investors make is to quickly jettison strategies based on short-term underperformance. Risk Stabilization is well grounded as a way to maintain a portfolio with exposures that match an investor's risk preferences, and it has a long history of adding value across many market cycles and environments. The recent episode of underperformance ought to be viewed against this historical backdrop.

It should be further noted that while for simplicity the discussion above is restricted to a very simple and transparent method of Risk Stabilization, in our own portfolios we have applied the same principle across many asset classes in many different ways. This broader approach is more robust, though given the dominance of equity market risk in our portfolios and in the world we are still subject to the risks of short-term underperformance documented above.

While the principles of Risk Stabilization have stood the test of time, finding the best way to execute on those principles is a continuous effort here at HighVista. We employ a variety of models to forecast volatilities and correlations and to react to market developments as effectively as possible. Challenging periods like August 2015 present a lens through which to re-evaluate the particular way we execute on our strategy. While the process of re-evaluating our approach against a changing world and additional data is never-ending, we remain convinced of the basic principles that underlie our approach: the dynamic nature of risk, its relationship to the future risk of loss and to expected returns, and our ability to adjust our portfolio to protect capital and add value over the long run.

Legal Disclosures:

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